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An Examination of the Driving Forces Behind ICT Adoption in Australian Rural and Regional Medical Practices

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Abstract

The use of information and communication technology (ICT) within the Australian general practice sector has been widely researched and is well documented. This paper adds to the knowledge by using data collected from 122 regional medical practitioners to show that the driving forces behind the adoption and use of ICTs can be grouped according to three factors: Improvement to Business and medical Care, External Pressure exerted by other practices, patients and medical authorities and the need to communicate with other businesses as well as medical groups.

1. Introduction

The use of information and communication technology (ICT) within the Australian small business sector is well documented. Studies [1, 2] have shown that while the adoption rates are lower than initially predicted, more and more small businesses are looking to ICTs as a means of reducing costs, reaching wider and more diverse markets and improving their own internal efficiency.

General practices form one of the many subsets of the Australian small business sector. Like most other groups, there is a growing use of ICTs in the day-to-day running of medical practices [3, 4, 5, 6].

While a number of studies have examined the driving forces behind the adoption and benefits derived from that adoption of ICTs in general practices [7, 8, 9] there has been no attempt to determine the nature of the underlying factors of these driving forces, often resulting in either duplicated, incomplete or fragmented findings. The purpose of this paper, then, is to examine the groupings and underlying factors of the drivers behind the adoption and use of ICTs in regional general practices in Australia. As general practices are specialised small businesses, the paper will begin by examining the nature of drivers of ICT adoption from the wider small business perspective. The paper will then examine the driving forces specific to the medical sector. The paper then presents a study of 122 regional GPs and the drivers for their adoption and use of ICTs. The results are presented in the form of a factor analysis of the rating of importance of the drivers. A discussion and conclusion are then presented.

2. Driving Forces for ICT Adoption (SMEs)

Initially ICTs were seen as a mechanism through which wider markets could be sought without increasing expenditure on communications. Studies [10, 11, 12, 13] found that small businesses adopted ICTs to reach new customers and markets, improve customer services, strengthen relationships with business partners and reduce costs. Indeed, [14, 15] found that many small businesses reported pressure from customers, business partners and rival firms to adopt and use ICTs.

Along with a need or desire to reach a wider customer base, a number of studies [16, 17, 18] have shown that there is an increasing awareness that ICT adoption and use can improve internal business functions including overall efficiency, control and follow-up.

3. Driving Forces for ICT Adoption (Medical)

A number of studies have examined the reasons behind and the benefits gained through ICT adoption and use in general practice. In a UK study, [19] noted that ICT adoption allowed a greater degree of strategic planning as well as the practice's overall ability to manage the health-care function. [20].

Showed that one of the driving forces and realised benefits of ICT adoption was improvement to the

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overall efficiency of the practice, particularly in terms of accounting and billing. Studies [21, 22] showed that reduction in costs as an expected benefit of ICT adoption in general practice.

Other drivers and benefits noted in the literature include contact with other clinicians regarding patient care [3]; elimination of redundancy in patient care [23]; enhancements to the effectiveness of the practice [24]; control of economic demands [26]; improved patient care [25]; and order entry of consumables by the practice [27].

Table 1: Drivers for Adoption of ICTs

Drivers
Pressure from Patients
Pressure from Suppliers
Pressure from Competing GPs
Pressure from Medical Authorities
Improvement to Information Storage and Retrieval
Improvement to Communications
Reduction of Business Costs
Improvement to Business Efficiency
Improvement to Patient Care and Contact
Improvement to Support a Systematic Approach to Disease Management
Streamlining Billing and Accounting
Strengthen Relations with Business partners
E-commerce
Keeping in Touch with medical and other Developments
Generating Prescriptions
Contact with Hospitals

4. Methodologies

Interviews were undertaken with general practitioners to develop a set of drivers that might influence a general practitioner to adopt and use ICT. Interviewees were provided with a set of drivers derived both from the small business literature as well as the medical literature and were asked the relevance of these to the regional Australian situation. Interviewees were also encouraged to add any other drivers considered relevant. 16 drivers were nominated (see Table 1). A questionnaire was developed. Respondents were asked, amongst other things, to rate the drivers of ICT adoption across a 5 point Likert scale (1 very unimportant, 5 very important). 690 surveys were distributed across 5 locations in Australia (Illawarra, Hunter, Ballarat, S.E.NSW, Rockhampton).

5. Results

Responses were obtained from 122 GPs, giving a response rate of 17.9%. 88 respondents were male, 34 female.

An examination of the correlation matrices (available from the authors) suggested the use of Factor Analysis Analysis to investigate any separate underlying factors and to reduce the redundancy of certain drivers indicated in the Correlation Matrix. The results of Kaiser-Meyer-Olkin MSA (.872) and Bartlett's Test for Sphericity (χ^2 = 1114, p = .000) indicated that the data set satisfied the assumptions for factorability. Principle Components Analysis was chosen as the method of extraction in order to account for maximum variance in the data using a minimum number of factors. A three factor solution was extracted with Eigenvalues 7.120, 2.732 and 1.073. These factors accounted for 68.297% of the variance. This was supported by an examination of the Scree plot. Table 2 provides the variance.

Table 2: Total variance Explained

Component	Eigenvalue	% Var.	Cum. %
Improvement to Business and Medical Care	7.120	44.500	44.500
External Pressure	2.732	`7.074	61.574
Communications	1.073	6.705	68.279

The resulting components were rotated using a Varimax procedure and simple structures were achieved (see Tables 3).

Table 3: Rotated Component Matrix

Drivers	C1	C 2	C3
Pressure from Patients		**.840**	
Pressure from Suppliers		**.823**	
Pressure from Competing GPs		**.821**	
Pressure from Medical Authorities		**.772**	
Improvement to Information Storage and Retrieval	**.859**		
Improvement to Communications	**.797**		
Reduction of Business Costs	**.658**		
Improvement to Business Efficiency	**.859**		
Improvement to Patient Care and Contact	**.887**		
Improvement to Support a Systematic Approach to Disease Management	**.833**		
Streamlining Billing and Accounting	**.737**		
Strengthen Relations with Business partners			**.703**
E-commerce			**.834**
Keeping in Touch with medical and other Developments			**.570**
Generating Prescriptions	**.776**		
Contact with Hospitals	**.545**		

C1 = Improvement to Business and Medical Care, C2 = Component 2 External Pressure, and C3 = Component 3 Comm's

6. Discussion

The results of the study indicate that correlations between drivers for ICT adoption in regional medical practices exist and enable the grouping of drivers according to 3 factors. These factors have been termed 'improvement to business and medical care', "external pressure' and 'communications'. The improvement to

business and medical care factor is related to drivers such as Improvement to Information Storage and Retrieval, Improvement to Communications, Reduction of Business Costs, Improvement to Business Efficiency, Improvement to Patient Care and Contact, Improvement to Support a Systematic Approach to Disease Management, Streamlining Billing and Accounting, Generating Prescriptions and Contact with Hospitals. The external pressure factor is related to drivers Pressure from Patients, Pressure from Suppliers, Pressure from Competing GPs and Pressure from Medical Authorities. The communications factor is related to Strengthen Relations with Business partners, E-commerce and Keeping in Touch with medical and other Developments.

A number of features are worthy of mention. Firstly, it is interesting to note that there appears no distinction between medical and business improvement. Where conventional wisdom might have suggested that there was a separation between those divers that are more general small business and those that are strictly medical, the findings show that these are considered as all part of one factor, termed 'improvement to business and medical care' by general practitioners. Secondly, it is interesting to note that while there is a factor termed communications and it related to Strengthening Relations with Business partners, E-commerce and Keeping in Touch with medical and other Developments, the driver Improvement to communications is not mapped to this factor but is mapped to the improvement to business and medical care factor. Finally, it is curious to note that the driver keeping in Touch with medical and other Developments is not considered part of the improvement to business and medical care factor, but is considered part of a separate factor termed communications.

The results of this study are significant in several ways. The analysis has shown that 16 of the most common drivers to ICT adoption can be grouped in relation to three main factors. This gives researchers a powerful explanatory tool because it reduces the "noise" in the data. Instead of accounting for 16 different drivers of ICT adoption can be explained as a result of one of three factors: 'improvement to business and medical care', "external pressure' and 'communications'. The Rotated Component Matrix also enables the prediction of the scores of each individual driver based on the score of the three factors, and vice versa. This has implications for research into ICT adoption drivers for general practice. Whereas before researchers have identified various drivers (such as the ones listed in Table 1), this is the first time a study has shown that certain drivers are correlated and can be logically grouped according to three factors. This makes it simpler not only to explain, but also predict drivers to ICT adoption in general practice.

7. Limitations

It should be noted that this study has several limitations. The data was collected from 5 regions in Australia. Therefore, although conclusions can be drawn, the results may not be generalisable to regional practices in other countries. The other limitation is that this is a quantitative study and further qualitative research needs to be conducted to gain a better understanding of the key issues.

8. Conclusions

The aim of this paper was to examine the groupings and priorities of drivers to ICT adoption in regional medical practices. A factor analysis was applied to the rating of drivers to ICT adoption. The factor analysis showed that 16 drivers could be grouped according to 3 factors 'improvement to business and medical care', "external pressure' and 'communications'. The results of this study are a significant contribution to the research of ICT drivers because they can be used as explanatory and prediction tools by researchers.

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